

Lecture 9

Mon. Competition & Oligopoly – part I



microeconomics II
first module

Modeling real markets

- ★ There are **no perfectly competitive** markets out there
- ★ There are **no pure monopolies**, either
- ★ Then, **why** do we consider such models? _

Monopolistic Competition

Assumptions

1. Many firms
2. Differentiated product
3. Free entry and exit _

Monopolistic Competition

1. Number of firms

- ★ Many firms
but **how many** are "many"?
- ★ Enough, so that the firms **do not interact**
firms will not act **strategically**
- ★ However, usually we assume a **smaller number** of firms than in PC _

2. Differentiation

- ★ The heterogeneity of product provides **some market power** to the firm
- ★ The amount of market power depends on the **degree of differentiation**
however, products are still highly **substitutable**
- ★ **Examples** of this very common market structure:
toothpaste, soap, detergent, electric devices _

Monopolistic Competition

3. Free entry and exit

- ★ Free entry and exit will affect the **L-R equilibrium**
- ★ If there are **S-R profits**
 - ◆ New firms will enter the industry
 - ◆ Supplied quantity will increase
 - ◆ Prices will drop
 - ◆ Profits will vanish
- ★ If there are **S-R losses**
 - ◆ Exit of firms will occur until losses vanish _

Monopolistic Competition

Short-run

The firm's demand:

- Downward sloping**
because of *differentiation*
- Relatively elastic**
there is still *substitution*

For the firm:

- ◆ $MR < p$
- ◆ Profits are maximized when $MR = MC$
- ◆ Profit can be *positive*

7

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Monopolistic Competition

Long-run

- ★ Profits attract *new firms*
no *barriers* to entry
- ★ Firm's demand *slides down*
new firms *absorb* some market demand
- ★ Firm's *output* and *price* fall
however, total industry output will *rise*
- ★ Price will keep dropping till it *reaches AC*, while $p > MC$
the firm still has *market power*

8

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Monopolistic Competition

MCo vs. PC equilibrium (L-R)

Perfect Competition

Monopolistic Competition

9

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Mon. Comp. vs. Monopoly

Monopoly revisited – model

- ★ Consider the linear demand
 $p = a - b \cdot q$
- ★ Constant marginal cost, c
- ★ Profit is
 $\Pi = (a - bq)q - c \cdot q = (a - c)q - bq^2$
- ★ Maximization of Π implies
 $a - c - 2bq = 0$
- ★ Thus,
 $q^* = \frac{a - c}{2b}, \quad p^* = \frac{a + c}{2}, \quad \Pi^* = \frac{(a - c)^2}{4b}$

10

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Mon. Comp. vs. Monopoly

Monopoly revisited – graph

11

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Mon. Comp. vs. Monopoly

Monopolistic competition model

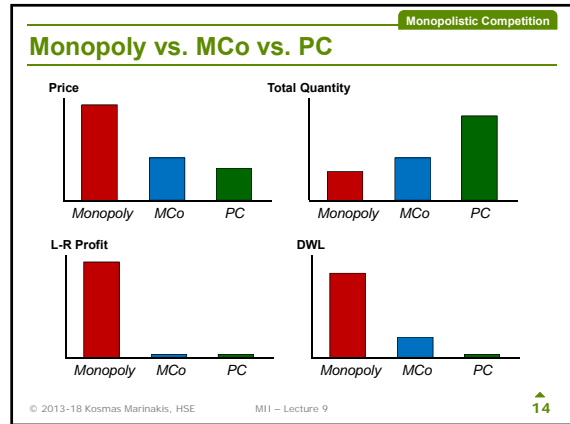
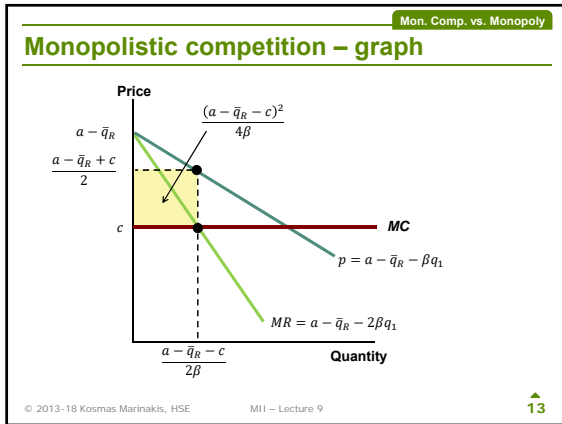
- ★ Consider the linear **demand** for firm 1
 $p = a - \bar{q}_R - \beta q_1$
- ★ Constant **marginal cost**, c
- ★ **Profit** for firm 1
 $\Pi_1 = (a - \bar{q}_R - \beta q_1)q_1 - c \cdot q_1 = (a - \bar{q}_R - c)q_1 - \beta q_1^2$
- ★ **Maximization** of Π_1 implies
 $a - \bar{q}_R - c - 2\beta q_1 = 0$
- ★ Thus,
 $q_1^* = \frac{a - \bar{q}_R - c}{2\beta}, \quad p^* = \frac{a - \bar{q}_R + c}{2}, \quad \Pi_1^* = \frac{(a - \bar{q}_R - c)^2}{4\beta}$

For firm 1, demand not the same as in monopoly:

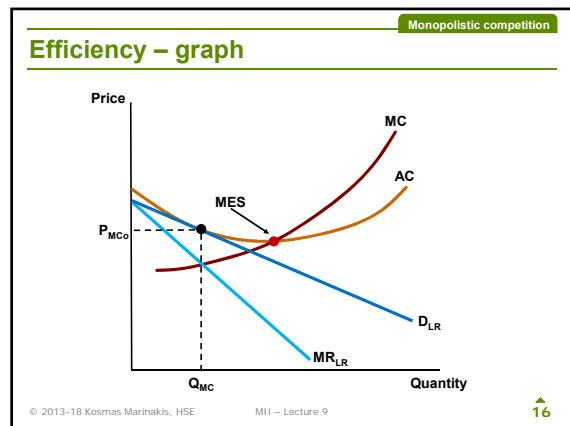
- The intercept is now lower
- The slope is smaller ($\beta < b$)

12

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- Monopolistic competition
- ### Economic efficiency of MCo
- ★ The market power yields a **higher price** than perfect competition
 - if price was lowered to the point where $MC = D$, **deadweight loss** would be eliminated
 - ★ With no economic profits in the long-run, the firm is still **not** producing at **minimum AC**
 - ◆ **MES** is to the **right** of zero profit equilibrium
 - ◆ There exists **excess capacity**
 - ◆ This is **inefficient** because AC would be lower with **fewer** firms
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- Monopolistic competition
- ### Regulation in MCo
- ★ This **inefficiency** is bad for consumers
 - ★ Then, should monopolistic competition be **regulated**?
 - ◆ Market power is **relatively small**
 - ◆ Competition is usually **satisfactory**
 - ◆ Deadweight loss is **small**
 - ★ Inefficiency is balanced by benefit of **increased product diversity**
 - diversity may easily **outweigh** deadweight loss
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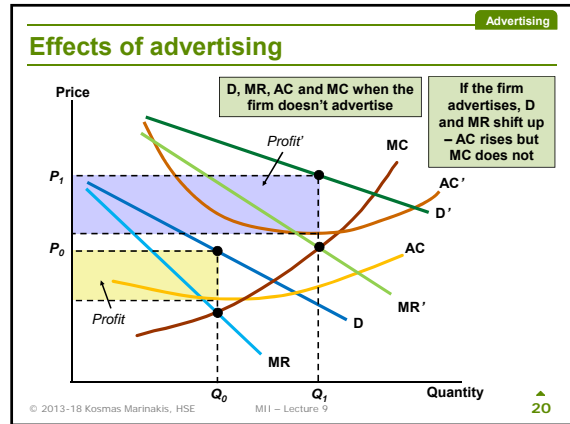
- ### Advertising
- ★ Firms with market power have to **decide how much** to advertise
 - ★ We will explore how firms choose **profit maximizing** advertising
 - decision **depends** on characteristics of demand for firm's product
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Advertising

Model assumptions

1. Firm sets **only one** price for product
2. Firm **knows** the demand $Q(p, \Delta)$ quantity is a **function** of price, p , and advertising expenditure, Δ
3. We can show the firm's cost **curves**, revenue curves, and profits: under advertising and under no advertising.

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Advertising

Model

- * The **profit** under advertising is

$$\Pi = p \cdot Q(p, \Delta) - C(Q(p, \Delta)) - \Delta$$
- * **Maximize** with respect to Δ

$$\frac{\partial \Pi}{\partial \Delta} = p \cdot \frac{\partial Q}{\partial \Delta} - \frac{\partial C}{\partial Q} \frac{\partial Q}{\partial \Delta} - 1 = 0 \Rightarrow$$

$$\Rightarrow (p - MC) \frac{\partial Q}{\partial \Delta} = 1$$
- * We can **manipulate** this equation as

$$p \frac{p - MC}{p} \frac{\partial Q}{\partial \Delta} = 1 \Rightarrow p \frac{1}{-\varepsilon_d} \frac{\partial Q}{\partial \Delta} = 1$$

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Advertising

Optimal Δ

$$p \frac{1}{|\varepsilon_d|} \frac{\partial Q}{\partial \Delta} = 1$$

- * Multiply both sides by Δ/Q

$$p \frac{1}{|\varepsilon_d|} \frac{\Delta}{Q} \frac{\partial Q}{\partial \Delta} = \frac{\Delta}{Q} \Rightarrow p \frac{1}{|\varepsilon_d|} \delta = \frac{\Delta}{Q} \Rightarrow \frac{\Delta}{pQ} = \frac{\delta}{|\varepsilon_d|}$$
- * Finally,

$$\frac{\Delta}{R} = \frac{\delta}{|\varepsilon_d|}$$

Advertisement as a fraction of total revenue

Ratio of elasticity of advertisement to the elasticity of demand

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Advertising

*Empirical estimates of elasticities

- * Supermarkets

$$\varepsilon_d \approx -10, \quad \delta \approx 0.1 \text{ to } 0.3$$
- * Convenience stores

$$\varepsilon_d \approx -5, \quad \delta \approx 0$$
- * Designer jeans

$$\varepsilon_d \approx -3.5, \quad \delta \approx 0.3 \text{ to } 1$$
- * Detergents

$$\varepsilon_d \approx -3.5 \text{ to } -4; \quad \delta \text{ very large}$$

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Oligopoly

Assumptions:

1. **Small number** of firms
2. **Product differentiation** may (or may not) exist
3. **Barriers** to entry.

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1. Number of firms

- ★ The number of firms is small so that **interaction** between firms is possible and meaningful
every firm must **take into account** other firms' actions
- ★ **Interaction** means that actions of others **affect me** and my actions **affect others**
 - ◆ You cannot think of actions **independently**, anymore
 - ◆ You must consider how rivals **may answer** your actions
- ★ **All firms assume** competitors are taking rival decisions into account.

2. Product differentiation

- ★ Product differentiation does **have an impact** in oligopoly models
but it is **not crucial**
- ★ This is because firms are not too many and thus **market power** can exist **without** product differentiation
- ★ Under oligopoly firms **are supposed to have** market power
however, it is **not certain** if they will be able to **use it** in the end.

3. Barriers

- ★ Oligopoly firms want to **protect their turf** by creating barriers to entry
- ★ Strategic actions to deter entry:
 - ◆ **Threaten** to engage in price cuts
 - ◆ Invest in **differentiation** (R&D or advertisement)
 - ◆ Build **excess capacity**
- ★ In most of the following models of oligopoly we will **not have a distinction** of S-R and L-R periods.

Examples of oligopolistic markets

- ★ Middle-high class cars
BMW, Mercedes, Audi, Volvo
- ★ High-end smartphones
iPhone, Galaxy, Pixel
- ★ Web based email
Hotmail, Gmail, Yahoo
- ★ Medication for ED
Viagra, Cialis, Levitra.

Competition with respect to what?

- ★ Firms have to choose in **which field** they will compete
 - ◆ Apple and Samsung are competing with respect to **technological advancement**
 - ◆ BMW and Benz are competing with respect to **quality**
 - ◆ Coke and Pepsi are competing with respect to **advertisement**
 - ◆ DKNY and Calvin Klein compete with respect to **design**
 - ◆ Mozilla and Chrome compete with respect to **market share**
 - ◆ HSE and NES compete with respect to **research**
 - ◆ Oil producing nations are competing with respect to **quantities**
 - ◆ Supermarkets compete with respect to **price**.

Map of models

- ★ **Cournot**: Static competition with respect to quantities
the choice variable of the firm is the **quantity**
- ★ **Bertrand**: Static competition with respect to prices
the choice variable of the firm is the **price**
- ★ **Stackelberg**: Pseudo-dynamic competition with respect to quantity
firms are allowed to move **sequentially**
- ★ **Collusion**: Firms act as if they were a monopoly.

Thank you!



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